APPENDIX C

Partition Coefficients For Cadmium

Appendix C

Partition Coefficients For Cadmium

C.1.0 Background

Cadmium K_d values and some important ancillary parameters that have been shown to influence cadmium sorption were collected from the literature and tabulated. Data included in this data set were from studies that reported K_d values and were conducted in systems consisting of

- Natural soils (as opposed to pure mineral phases)
- Low ionic strength solutions (<0.1 M)
- pH values between 4 and 10
- Solution cadmium concentration less than 10-5 M
- Low humic materials concentrations (<5 mg/l)
- No organic chelates (such as EDTA)

A total of 174 cadmium K_d values were found in the literature (see summary in Section C.3.0). At the start of the literature search, attempts were made to identify K_d studies that included ancillary data on aluminum/iron-oxide concentrations, calcium and magnesium solution concentrations, pH, cation exchange capacity (CEC), clay content, redox status, organic matter concentrations and sulfide concentrations. Upon reviewing the data and determining the availability of cadmium K_d measurements having ancillary information, K_d values were collected that included information on clay content, pH, CEC, total organic carbon (related to organic matter), and dissolved cadmium concentrations. The selection of these parameters was based on availability of data and the possibility that the parameter may impact cadmium K_d values. Of the 174 cadmium K_d values included in our tabulation, 62 values had associated clay content data, 174 values had associated pH data, 22 values had associated CEC data, 63 values had total organic carbon data, 172 values had associated cadmium concentration data, and 16 had associated aluminum/iron-oxide data. The descriptive statistics for this total set of cadmium K_d values are listed in Table C.1.

Table C.1. Descriptive statistics of the cadmium K_d data set for soils.

	Cadmium K_d (ml/g)	Clay Content (wt.%)	pH	CEC (meq/100g)	TOC (mg/l)	Cd Conc. (mg/l)	Fe Oxides (wt.%)
Mean	226.7	14.2	5.88	21	5.5	3.67	1.32
Standard Error	44.5	1.7	0.09	3	0.85	0.48	0.53
Median	121.8	10.24	5.83	23	2.0	0.01	0.38
Mode	80.0	6	6.8	2	0.4	0.01	0.19
Std. Dev	586.6	13.5	1.16	15	6.8	6.27	2.12
Sample Variance	344086	182	1.34	245	45.9	39.4	4.51
Range	4359	86.2	6.20	58	32.4	34.9	8.28
Minimum	0.50	.9	3	2	0.2	0.01	0.01
Maximum	4360	87.1	9.2	60	32.6	35	8.29
No. Samples	174	62	174	22	63	172	16

C.2.0 Approach and Regression Models

C.2.1 Correlations with Cadmium K_d Values

Linear regression analyses were conducted between the ancillary parameters and cadmium K_d values. The correlation coefficients from these analyses are presented in Table C.2. These results were used for guidance for selecting appropriate independent variables to use in the look-up table. The largest correlation coefficient was between pH and log(K_d). This value is significant at the 0.001 level of probability. Attempts at improving this correlation coefficient through the use of additional variables, *i.e.*, using multiple-regression analysis, were not successful. Multiple regression analyses were conducted with the following pairs of variables to predict cadmium K_d values: total organic carbon and pH, clay content and pH, total organic carbon and iron-oxides, and pH and CEC.

Table C.2. Correlation coefficients (r) of the cadmium K_d data set for soils**.**

	Cadmium K_d	log (K_d)	Clay Content	pH	CEC	TOC	Cd Conc.
Cadmium K_d	1						
log (K_d)	0.69	1					
Clay Conc.	-0.04	0.03	1				
pH	0.50	0.75	0.06	1			
CEC	0.40	0.41	0.62	0.35	1		
TOC	0.20	0.06	0.13	-0.39	0.27	1	
Cd Conc.	-0.02	-0.10	-0.39	0.22	-0.03	-0.09	1
Fe Oxide Conc.	0.18	0.11	-0.06	0.16	0.19	0.18	0.01

C.2.2 Cadmium K_d Values as a Function of pH

The cadmium K_d values plotted as a function of pH are presented in Figure C.1. A large amount of scatter exists in these data. At any given pH, the range of K_d values may vary by 2 orders of magnitude. This is not entirely satisfactory, but as explained above, using more than 1 variable to help categorize the cadmium K_d values was not fruitful.

The look-up table (Table C.3) for cadmium K_d values was categorized by pH. The regression equation for the line presented in Figure C.1 is:

$$\text{Cd } K_d = -0.54 + 0.45(\text{pH}). \qquad \text{(C.1)}$$

The minimum and maximum values were estimated based on the scatter of data points observed in Figure C.1.

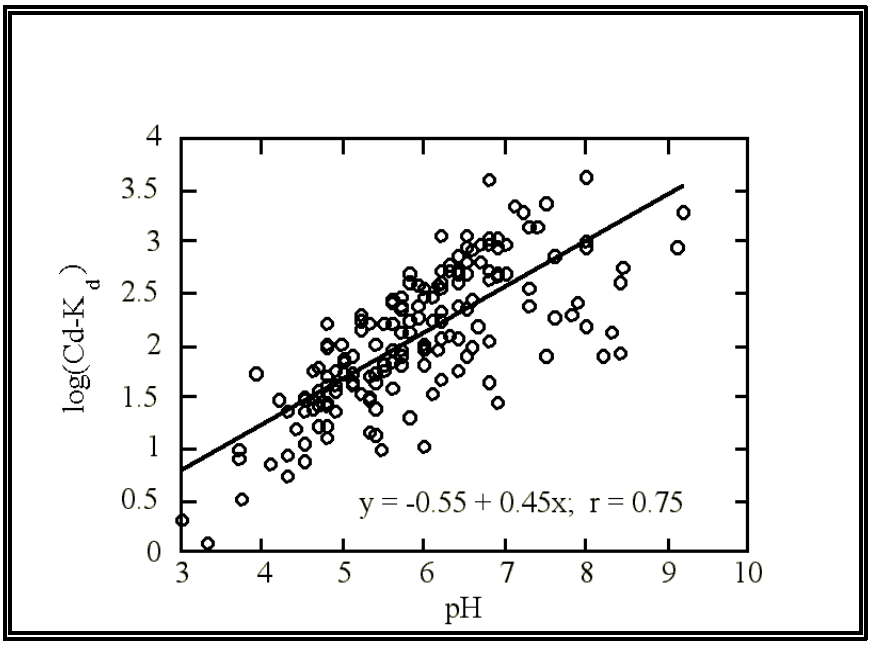

Figure C.1. Relation between cadmium K_d values and pH in soils.

Table C.3. Look-up table for estimated range of K_d values for cadmium based on pH. [Tabulated values pertain to systems consisting of natural soils (as opposed to pure mineral phases), low ionic strength (< 0.1 M), low humic material concentrations (<5 mg/l), no organic chelates (such as EDTA), and oxidizing conditions.]

	pH		
K_d (ml/g)	**3 - 5**	**5 - 8**	**8 - 10**
Minimum	1	8	50
Maximum	130	4,000	12,600

C.3.0 Data Set for Soils

Table C.4 lists the available K_d values for cadmium identified for experiments conducted with only soils. The K_d values are listed with ancillary parameters that included clay content, pH, CEC, TOC, solution cadmium concentrations, and iron-oxide concentrations

Table C.4. Cadmium K_d data set for soils.

Cd K_d (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref.[a]
52.5	54.7	4.8	30.2	1.54	1	0.33	0.005 M $CaNO_3$	Alligator Ap	Converted Freund. to K_d Using 1ppm	1
288.4	8.3	5.7	2	0.61	1	0.1	0.005 M $CaNO_3$	Cecil Ap	Converted Freund. to K_d Using 1ppm	1
13.9	51.2	5.4	2.4	0.26	1	0.08	0.005 M $CaNO_3$	Cecil B	Converted Freund. to K_d Using 1ppm	1
186.6	0.9	5.9	22.54	6.62	1	1.68	0.005 M $CaNO_3$	Kula Ap1	Converted Freund. to K_d Using 1ppm	1
52.7	17.6	3.9	26.9	11.6	1	1.19	0.005 M $CaNO_3$	Lafitte Ap	Converted Freund. to K_d Using 1ppm	1
91.2	28.2	6	11	1.67	1	0.19	0.005 M $CaNO_3$	Molokai Ap	Converted Freund. to K_d Using 1ppm	1
28.8	2.8	6.9	4.1	0.21	1	0.06	0.005 M $CaNO_3$	Norwood Ap	Converted Freund. to K_d Using 1ppm	1
97.9	6.2	6.6	8.6	0.83	1	0.3	0.005 M $CaNO_3$	Olivier Ap	Converted Freund. to K_d Using 1ppm	1
5.5	3.8	4.3	2.7	1.98	1	0	0.005 M $CaNO_3$	Spodisol	Converted Freund. to K_d Using 1ppm	1
755.1	23.9	7.6	48.1	4.39	1	0.19	0.005 M $CaNO_3$	Webster Ap	Converted Freund. to K_d Using 1ppm	1

Cd K_d (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref.[a]
14.4	2.8	5.3	2	2.03	1	0.42	0.005 M $CaNO_3$	Windsor Ap	Converted Freund. to K_d Using 1ppm	1
87.1		8.4	60	1.44	1	1.07	Water	Vertic Torrifluvent	Converted Freund. to K_d Using 1ppm	2
33.88		5.2	33.8	32.6	1		Water	Organic	Converted Freund. to K_d Using 1ppm	2
20.42		5.8	23.8	3	1	8.29	Water	Boomer, Ultic Haploxeralf	Converted Freund. to K_d Using 1ppm	2
10.47		6	25	3.2	1	1.07	Water	UlticPalexeralf	Converted Freund. to K_d Using 1ppm	2
80		8.2	8.2	0.21	35		0.01 M NaCl	Gevulot	Calc. Fig 1.	3
200		7.8	15.4	0.83	25		0.01 M NaCl	Bet Yizhaq	Calc. Fig 1.	3
133.3		8.3	18.9	0.23	30		0.01 M NaCl	Gilat	Calc. Fig 1.	3
181.8		7.6	31.8	0.79	25		0.01 M NaCl	Maaban Michael	Calc. Fig 1.	3
266.7		7.9	37	0.86	15		0.01 M NaCl	Hahoterim	Calc. Fig 1.	3
8	8	3.7		1.6	11.2		0.01 M $NaNO_3$	Downer Loamy Sand		4
17	8	4.8		1.6	11.2		0.01 M $NaNO_3$	Downer Loamy Sand		4
32	8	5.3		1.6	11.2		0.01 M $NaNO_3$	Downer Loamy Sand		4
64	8	6		1.6	11.2		0.01 M $NaNO_3$	Downer Loamy Sand		4
92	8	6.2		1.6	11.2		0.01 M $NaNO_3$	Downer Loamy Sand		4
110	8	6.8		1.6	11.2		0.01 M $NaNO_3$	Downer Loamy Sand		4
250	8	7.3		1.6	11.2		0.01 M $NaNO_3$	Downer Loamy Sand		4

Cd K_d (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref.[a]
580	8	8.5		1.6	11.2		0.01 M $NaNO_3$	Downer Loamy Sand		4
0.5	6	3.1		0.4	11.2		0.01 M $NaNO_3$	Freehold Sandy Loam A Horizon		4
3.3	6	3.8		0.4	11.2		0.01 M $NaNO_3$	Freehold Sandy Loam A Horizon		4
7.5	6	4.5		0.4	11.2		0.01 M $NaNO_3$	Freehold Sandy Loam A Horizon		4
10	6	5.5		0.4	11.2		0.01 M $NaNO_3$	Freehold Sandy Loam A Horizon		4
34	6	6.1		0.4	11.2		0.01 M $NaNO_3$	Freehold Sandy Loam A Horizon		4
45	6	6.8		0.4	11.2		0.01 M $NaNO_3$	Freehold Sandy Loam A Horizon		4
80	6	7.5		0.4	11.2		0.01 M $NaNO_3$	Freehold Sandy Loam A Horizon		4
150	6	8		0.4	11.2		0.01 M $NaNO_3$	Freehold Sandy Loam A Horizon		4
420	6	8.4		0.4	11.2		0.01 M $NaNO_3$	Freehold Sandy Loam A Horizon		4
900	6	9.1		0.4	11.2		0.01 M $NaNO_3$	Freehold Sandy Loam A Horizon		4
2.1	13	3		16.8	11.2		0.01 M $NaNO_3$	Boonton Loam		4
10	13	3.7		16.8	11.2		0.01 M $NaNO_3$	Boonton Loam		4
30	13	4.2		16.8	11.2		0.01 M $NaNO_3$	Boonton Loam		4
57	13	4.6		16.8	11.2		0.01 M $NaNO_3$	Boonton Loam		4

Cd K_d (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref.[a]
101	13	5		16.8	11.2		0.01 M $NaNO_3$	Boonton Loam		4
195	13	5.2		16.8	11.2		0.01 M $NaNO_3$	Boonton Loam		4
420	13	5.8		16.8	11.2		0.01 M $NaNO_3$	Boonton Loam		4
1,200	13	6.2		16.8	11.2		0.01 M $NaNO_3$	Boonton Loam		4
4,000	13	6.8		16.8	11.2		0.01 M $NaNO_3$	Boonton Loam		4
1.2	16	3.3		9.8	11.2		0.01 M $NaNO_3$	Rockaway Stony Loam		4
7.1	16	4.1		9.8	11.2		0.01 M $NaNO_3$	Rockaway Stony Loam		4
27	16	4.8		9.8	11.2		0.01 M $NaNO_3$	Rockaway Stony Loam		4
53	16	5.1		9.8	11.2		0.01 M $NaNO_3$	Rockaway Stony Loam		4
170	16	5.6		9.8	11.2		0.01 M $NaNO_3$	Rockaway Stony Loam		4
300	16	6.1		9.8	11.2		0.01 M $NaNO_3$	Rockaway Stony Loam		4
390	16	6.2		9.8	11.2		0.01 M $NaNO_3$	Rockaway Stony Loam		4
910	16	6.5		9.8	11.2		0.01 M $NaNO_3$	Rockaway Stony Loam		4
1,070	16	6.8		9.8	11.2		0.01 M $NaNO_3$	Rockaway Stony Loam		4
43	10	4.8		2.4	11.2		0.01 M $NaNO_3$	Fill Material - Delaware River		4
67	10	5.7		2.4	11.2		0.01 M $NaNO_3$	Fill Material - Delaware River		4
130	10	6.3		2.4	11.2		0.01 M $NaNO_3$	Fill Material - Delaware River		4

Cd K_d (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref.[a]
150	10	6.7		2.4	11.2		0.01 M $NaNO_3$	Fill Material - Delaware River		4
370	10	7.3		2.4	11.2		0.01 M $NaNO_3$	Fill Material - Delaware River		4
880	10	8		2.4	11.2		0.01 M $NaNO_3$	Fill Material - Delaware River		4
1,950	10	9.2		2.4	11.2		0.01 M $NaNO_3$	Fill Material - Delaware River		4
1,000	12	8			1	3.7	Carbonate Groundwater	Interbed	pH of Groundwater	5
4,360	12.4	8			1	2.5	Carbonate Groundwater	Alluvium	pH of Groundwater	5
536.8	25.2	6.8	27.5				0.01 M NaCl	Soil A	Desorption	6
440	25.2	6.8	27.5				0.01 M NaCl	Soil A	Desorption	6
9		4.3			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
23.4		4.3			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
15.8		4.4			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
11.3		4.5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
31.2		4.5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
32.5		4.5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
23		4.5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
17.1		4.7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7

Cd K_d (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref.[a]
13.1		4.8			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
24.9		4.6			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
26.8		4.7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
36.2		4.7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
32.9		4.7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
37.2		4.7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
29.2		4.8			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
28.3		4.8			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
22.6		4.9			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
37.4		4.9			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
40.9		4.9			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
63.5		4.7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
25.2		5.4			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
29.9		5.3			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
33.7		5.2			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
44.3		5.1			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
42.8		5.1			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
53.5		5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
56.2		4.9			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7

Cd K_d (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref.[a]
68.7		5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
82.3		5.1			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
75.7		5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
95.2		4.8			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
103		4.8			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
160		4.8			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
43.3		5.4			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
55.2		5.4			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
52.2		5.3			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
40.3		5.6			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
56.1		5.5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
67.5		5.5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
102.9		5.4			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
164.4		5.5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
163.8		5.3			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
202.1		5.2			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
172.4		5.2			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
149		5.2			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
72.8		5.6			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7

Cd K_d (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref.[a]
81.6		5.7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
90		5.7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
94.3		5.6			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
48.1		6.2			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
56.5		6.4			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
81		6.5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
122.3		6.4			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
121.4		6.2			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
101.5		6			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
99.3		6			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
107.8		6			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
219.5		6.2			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
179.2		6.2			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
177		6.1			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
360.4		6			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
305.2		6			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
236.8		5.9			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
186.3		5.9			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
174.8		5.8			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7

Cd K_d (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref.[a]
138.7		5.8			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
132.5		5.7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
375.6		5.9			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
403.3		5.8			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
510.8		5.8			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
225.9		5.7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
227.3		5.7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
248		5.7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
253.1		5.6			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
277.2		5.6			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
240.7		6.4			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
227.8		6.5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
281.1		6.6			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
551.2		6.2			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
519.8		6.2			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
418.7		6.2			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
353.7		6.2			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
400.8		6.4			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
609.2		6.3			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7

Cd K_d (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref.[a]
545.7		6.3			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
515.9		6.4			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
545.7		6.4			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
760.9		6.4			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
665.7		6.5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
503.2		6.5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
515.2		7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
488.9		6.9			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
481		6.9			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
461.6		6.9			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
1,151		6.5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
868.7		6.6			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
637.2		6.7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
970.9		6.7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
950.5		6.8			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
886.2		6.9			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
1,106		6.9			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
970.9		7			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
2,248		7.1			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7

Cd K_d (ml/g)	Clay Cont. (wt%)	pH	CEC (meq/ 100 g)	TOC (wt%)	[Cd] (mg/l)	Fe Oxides (wt.%)	Solution	Soil Identification	Comments	Ref.[a]
1,909		7.2			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
1,411		7.3			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
1,383		7.4			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7
2,337		7.5			0.01		0.001M $CaCl_2$	Agricultural Danish Soil	Co = 0.7 to 12.6 ppb	7

a 1 = Buchter *et al.*, 1989; 2 = Garcia-Miragaya, 1980; 3 = Navrot *et al.*, 1978; 4 = Allen *et al.*, 1995; 5 = Del Debbio, 1991; 6 = Madrid *et al.*, 1992; 7 = Anderson and Christensen , 1988

C.4.0 References

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